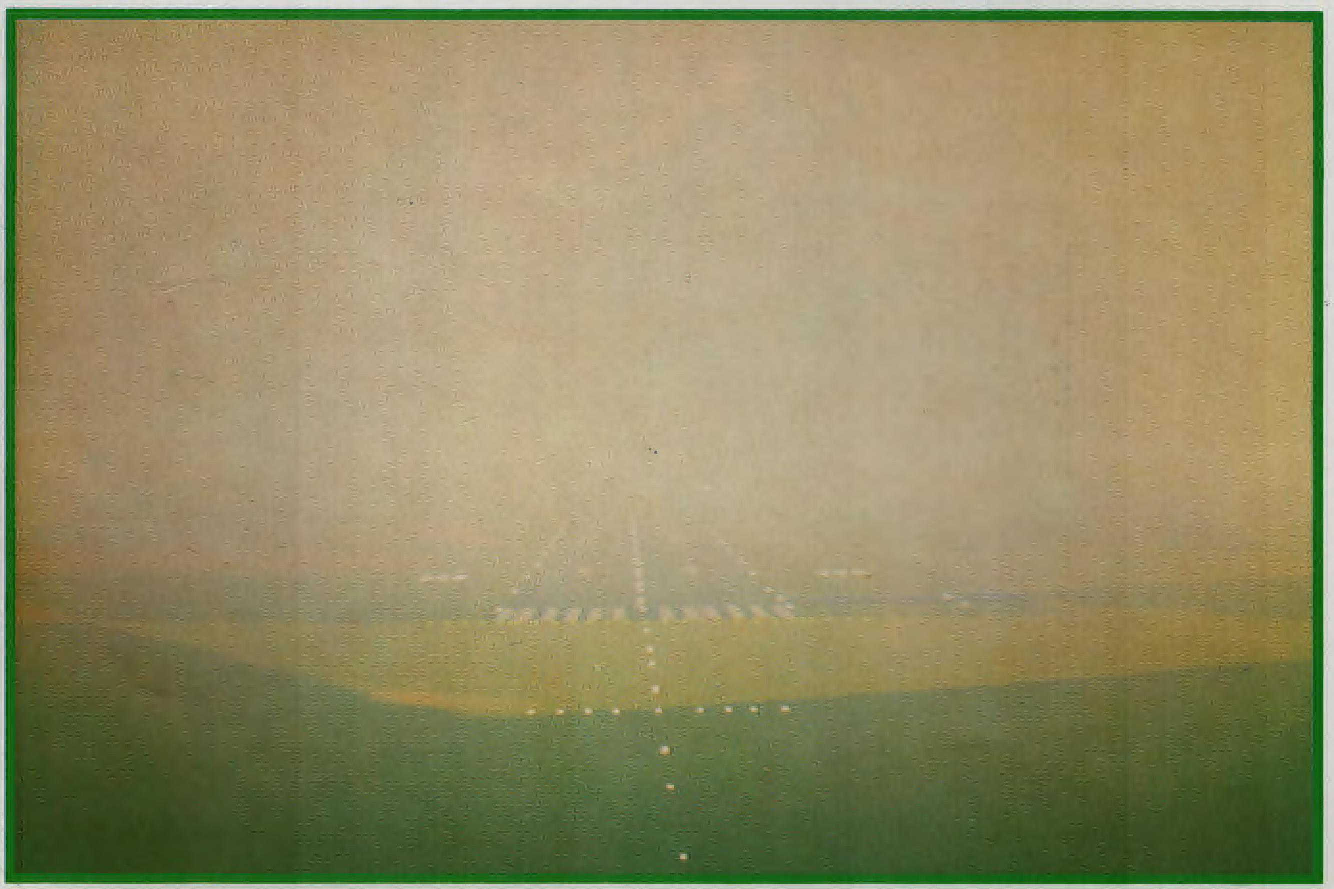
VISUAL SIMULATION

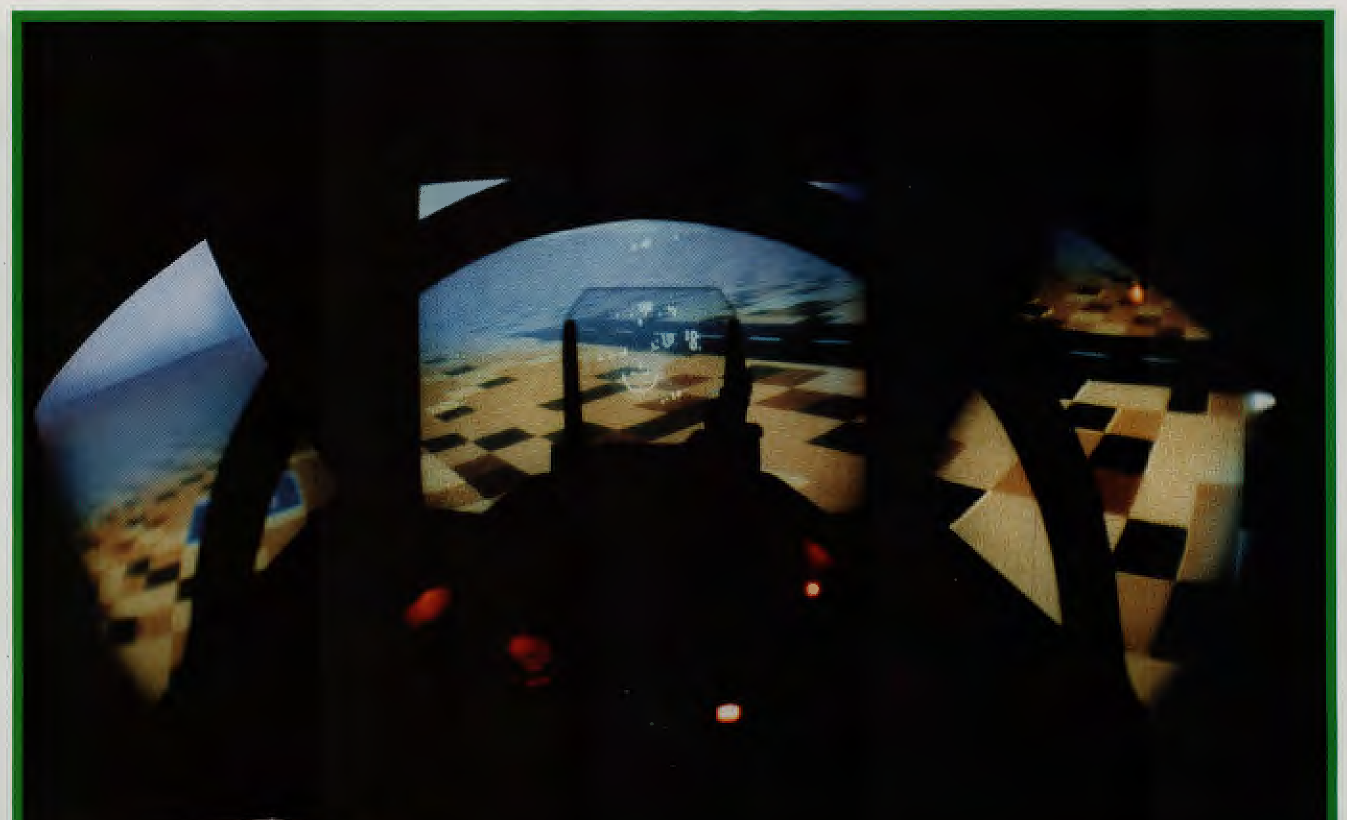
Low cost visual for trainers/simulators

Night situation — civil runway.



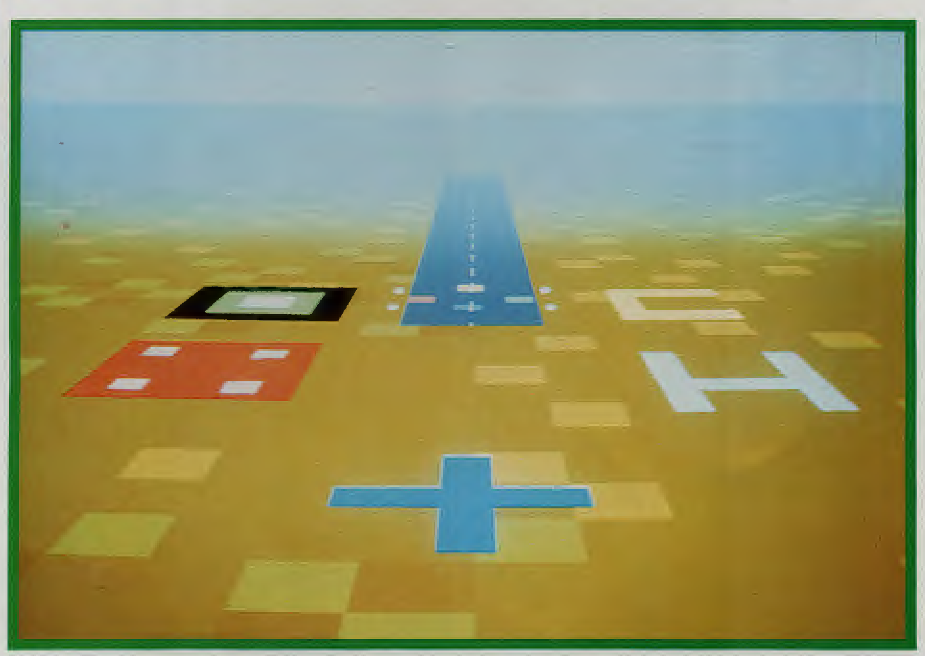
Poor visibility situation – civil runway.

Cover photograph of Xingu cockpit by courtesy of ACEC, Charleroi, Belgium.

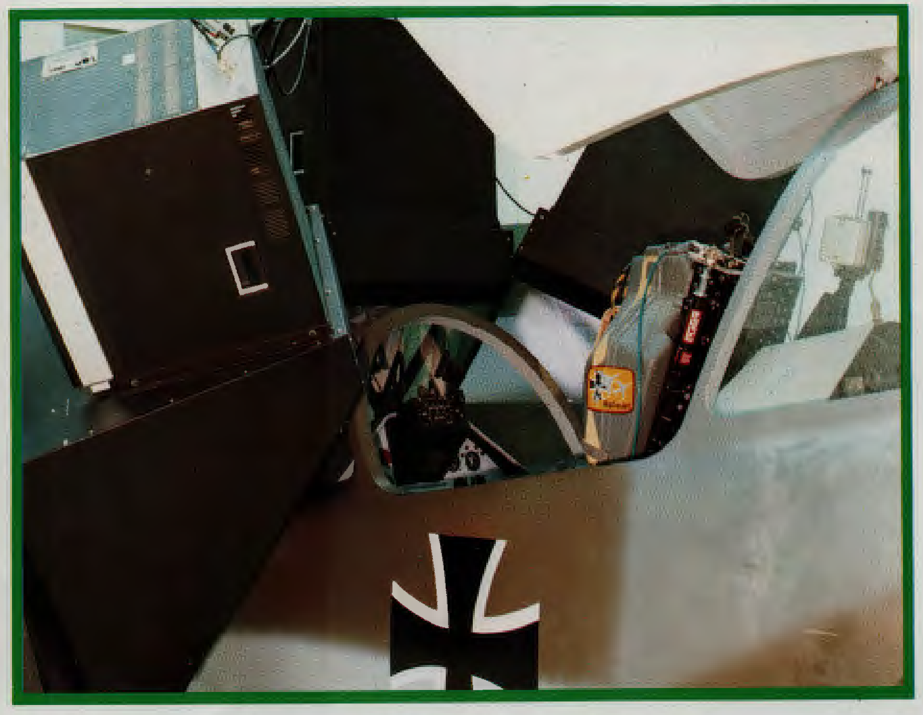


Fish-eye view of cockpit showing wide-angle view from pilot position of runway.

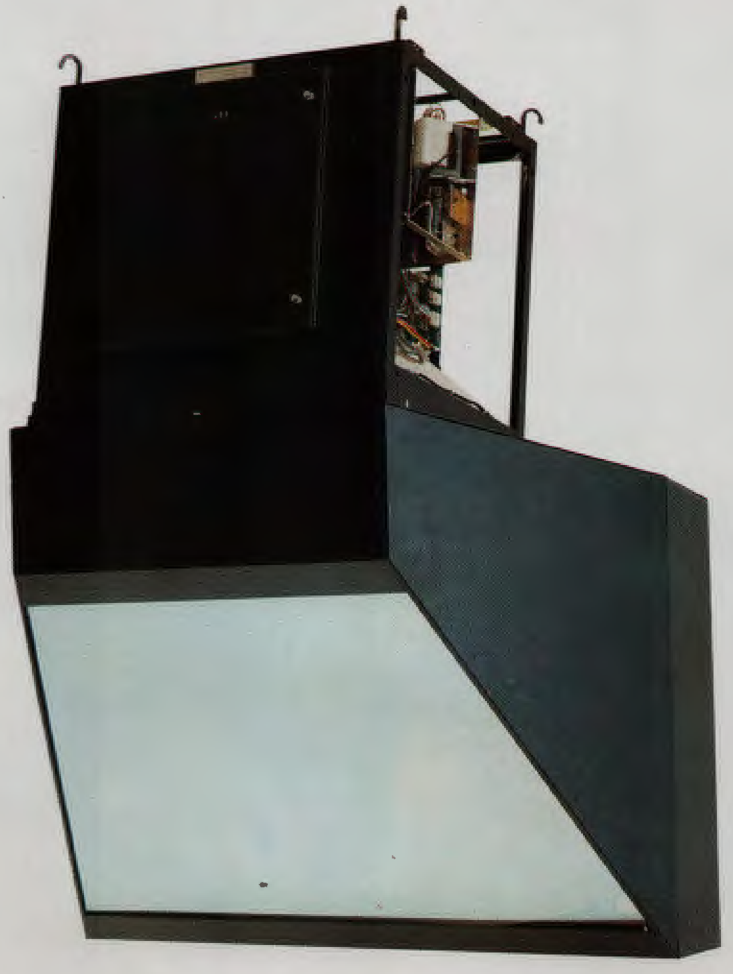
Photograph by courtesy of Dornier GmbH,
Friednichshafen, W. Germany, taken on Alpha-Jet research simulation.



Up to 20 targets are available which can be superimposed.



3-window collimated display on fighter cockpit.



Display unit showing mirror collimation, with shadow mask CRT display, built for close adjacent mounting.

Visual systems for flight simulation are becoming more accepted, and their use is growing because of rapid escalation in the cost of flying, environmental conditions, lack of suitable training locations, etc.

Computer Generated Image (CGI) systems have been developed aimed at the very high fidelity of the outside world. This causes these systems to be very expensive, both in capital outlay and software database cost. As such, their purchase and use can not be justified on cost effective grounds in some instances, while many current CGI systems are difficult to adapt to analogue simulators.

The OPDIS IV systems are low-cost, solid-state visuals, operating in true real-time, with inherent six degrees of freedom. Multi-window configurations are available to give wrap-round vision.

OPDIS IV M

This system generates a daylight image of a limitless flat world on which various ground targets can be positioned. Under the control of the host, these can either be fixed or moving and controlled in size, shape and colour. Target areas can be superimposed to create special shapes.

A runway, with length and width under user control, is provided with VASI or PAPI lights as required.

OPDIS IV C

This system generates a similar terrain but is fully day-dusk-night. A complex runway with full lighting to Cat 2 standards is provided together with taxiways. An alternative, simpler runway is also available.

Both systems allow full control of atmospheric conditions and provide the pilot with a responsive visual environment giving many of the visual cues needed in training. Their area of use extends from basic to advanced, tactical and civil flying.

Basic Flying

Taxying, take-off and landing, crosswind conditions, effects of controls, general handling, circuits and approaches, including overshoot procedures.

Applied and operational flying

Navigation, both visual and in conjunction with other navigation equipment, minimal weather conditions, transition to/from visual flight, decision making on landing or overshoot. Visual reconnaissance procedures and attack procedures including target acquisition, weapon aiming and tracking up to release point.

Emergency Procedures

Engine failures on take-off, asymetric flight, wheel and brake malfunction on take-off and landing, tailchute failure, arrester cable engagements.

Technical description and specification

Military System OPDIS IV M

Terrain:

6.4 by 6.4 N.M. (12 by 12 km) made up from an irregular array of rectangles. This can be rescaled dynamically from 1 to 31 times basic size.

Four different terrain patterns user selectable.

Three sets of four terrain colours user selectable.

Haze blanks end of computed terrain to remove undesired effects and assist sense of distance.

Runway and Targets:

A simple runway, with centreline markings and VASIs or PAPIs is provided. Size under user control; length 0-10000 feet (0-3000m), width 0-1000 feet (0-300m).

Four targets, with four colours user selectable, size separately adjustable in length and width 0-1000 feet, (0-300m) position under user control can move with respect to terrain and/or other targets.

Targets and runway can be superimposed.

Cloud Base:

Adjustable 0-100% of actual height range. Same range for cloud top. This can be used for blanking view of ground while changing the terrain scale factor.

Visibility:

0-100% of maximum terrain range.

Daylight image generation.

Civil System – OPDIS IV C

As OPDIS IV M except:

Terrain:

10 N.M. by 10 N.M. (19 by 19 km).

Runway:

Two runways accessible; one standard (150 feet wide, 9600 feet long) with threshold, centreline and TDZ markings, two taxiway stubs; second smaller, simpler pattern to user specification.

The runway is at an angle to the terrain squares to remove directional effects.

Lighting:

Runway edge and centreline lighting. Green threshold bar, coded red overrun bar. Coded centreline plus 5 bar approach. VASIs or PAPIs. Intensities under user control.

Cloud:

Base; 0-2700 feet: Top, base – 10000 feet, Scud – user selectable. Ability to fly above cloud, blue sky overhead.

Visibility:

Both Slant and RVR are provided, range zero – maximum system visibility.

Day-Dusk-Night operation, with suitable horizon glow at night.

Both Systems – Common Details

No limitations on Yaw, Pitch, Roll angles. Can operate up to Mach 2.

Raster scan system, with high scan rate.

Construction:

Image generator is housed in free-standing 19″ standard cabinet.

Multi-window Facilities:

The system can be supplied for wrap-round displays and matched in azimuth and elevation.

In a side-by-side cockpit, pilot and co-pilot have the same image and additional windows can be mounted to the left and right to extend the viewing angle.

Power Consumptions:

A 3-channel system consumes less than 1500 watts, single phase supply.

Input link to Simulator:

Normally a bit-parallel word-serial digital link but purpose built analogue interfaces can be supplied.

Display:

Infinity collimated display, using spherical mirror and beam splitter, with high resolution 26 inch (67cm) shadow mask tube:

Viewing Angles:	Horizontal	Vertical
	±22°	+12°–15°
	±23°	±17°

Clearance from preferred pilot position to beam splitter, horizontally, 36″/920mm.

Multiple displays can be supplied for wide-angle systems.

Options:

A fully digital capability Navigation System can be integrated and interfaced to replace less efficient systems, or to provide full airline navigation facilities on new equipment.

Projected image display, replacing collimated display.

Up to 20 ground targets.

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